

In the Claims

1. (Currently Amended) A method for managing network traffic, comprising:
provisioning an internet protocol (IP) network for communicating traffic, the IP network operated by an IP service provider and comprising a plurality of nodes coupled by IP links activated in an IP layer and available for the routing of label switched paths (LSPs);

monitoring the IP network for a congestion event;

upon detecting a congestion event, selecting a ~~label-switched-path (LSP)-LSP~~ of the IP network for reroute;

receiving a transformed topology constructed by an optical transport service provider of a wavelength division multiplex (WDM) topology, the transformed topology comprising a subset of lightpaths of the WDM topology that are available for, but not currently activated in, the IP layer;

computing, based on the transformed topology, a hybrid path route for the selected LSP between a first node and a second node of the plurality of nodes, the hybrid path route comprising at least one IP link already activated in the IP layer and at least one lightpath of a ~~wavelength-division-multiplex (WDM) Topology-the WDM topology~~ coupled to the IP network but not activated in the IP layer;

determining whether performance of the hybrid path route for the selected LSP reduces costs; and

if the hybrid path route reduces costs:

activating a new IP link on each of the at least one lightpaths of the WDM topology, the new IP link being added to the IP links available for the routing of LSPs; and

rerouting the selected LSP according to the hybrid path route.

2. (Original) The method of Claim 1, further comprising decommissioning an idle IP link after rerouting the selected LSP.

3. (Cancelled)

4. (Original) The method of Claim 1, wherein determining whether performance of the hybrid path route for the selected LSP reduces costs comprises accounting for a cost associated with each IP link and each lightpath of the hybrid path route.

5. (Original) The method of Claim 1, wherein activating a new IP link on each of the at least one lightpaths of the WDM topology comprises:

allocating an unused router port on each end of each of the at least one lightpaths; and
activating the allocated router ports with respective established lightpaths.

6. (Original) The method of Claim 1, wherein each of the plurality of nodes of the IP network comprises an IP router.

7. (Original) The method of Claim 1, wherein each of the lightpaths of the WDM topology couples optical crossconnects of the WDM topology.

8. (Canceled)

9. (Currently Amended) A system for managing network traffic, comprising:
an internet protocol (IP) network for communicating traffic, the IP network operated by an IP service provider and comprising a plurality of nodes coupled by IP links activated in an IP layer and available for the routing of label switched paths (LSPs);

a wavelength division multiplex (WDM) Topology coupled to the IP network, the WDM topology comprising a plurality of lightpaths operable to communicate optical traffic;
and

a controller operable to:

provision the IP network for communicating traffic;

monitor the IP network for a congestion event;

upon detecting a congestion event, select a ~~label switched path (LSP)~~ LSP of the IP network for reroute;

receive a transformed topology constructed by an optical transport service provider of a wavelength division multiplex (WDM) topology, the transformed topology comprising a subset of lightpaths of the WDM topology that are available for, but not currently activated in, the IP layer;

compute, based on the transformed topology, a hybrid path route for the selected LSP between a first node and a second node of the plurality of nodes, the hybrid path route comprising at least one of the IP links already activated in the IP layer and at least one lightpath of the plurality of lightpaths of the WDM topology coupled to the IP network but not activated in the IP layer;

determine whether performance of the hybrid path route for the selected LSP reduces costs; and

if the hybrid path route reduces costs:

activate a new IP link on each of the at least one lightpaths of the plurality of lightpaths of the WDM topology, the new IP link being added to the IP links available for the routing of LSPs; and

reroute the selected LSP according to the hybrid path route.

10. (Original) The system of Claim 9, wherein the controller is further operable to decommission an idle IP link after rerouting the selected LSP.

11. (Cancelled)

12. (Original) The system of Claim 9, wherein a controller operable to determine whether performance of the hybrid path route for the selected LSP reduces costs comprises a controller operable to account for a cost associated with each IP link and each lightpath of the hybrid path route.

13. (Original) The system of Claim 9, wherein a controller operable to activate a new IP link on each of the at least one lightpaths of the plurality of lightpaths of the WDM topology comprises a controller operable to:

allocate an unused router port on each end of each of the at least one lightpaths; and
activate the allocated router ports with respective established lightpaths.

14. (Original) The system of Claim 9, wherein each of the plurality of nodes of the IP network comprises an IP router.

15. (Original) The system of Claim 9, wherein each of the plurality of lightpaths of the WDM topology couples optical crossconnects of the WDM topology.

16. (Canceled)

17. (Currently Amended) Logic for managing network traffic, the logic encoded in computer readable media and operable when executed by a processor to:

provision an internet protocol (IP) network for communicating traffic, the IP network operated by an IP service provider and comprising a plurality of nodes coupled by IP links activated in an IP layer and available for the routing of label switched paths (LSPs);

monitor the IP network for a congestion event;

upon detecting a congestion event, select a ~~label switched path (LSP)~~ LSP of the IP network for reroute;

receive a transformed topology constructed by an optical transport service provider of a wavelength division multiplex (WDM) topology, the transformed topology comprising a subset of lightpaths of the WDM topology that are available for, but not currently activated in, the IP layer;

compute, based on the transformed topology, a hybrid path route for the selected LSP between a first node and a second node of the plurality of nodes, the hybrid path route comprising at least one IP link already activated in the IP layer and at least one lightpath of a ~~wavelength division multiplex (WDM) Topology~~ the WDM topology coupled to the IP network but not activated in the IP layer;

determine whether performance of the hybrid path route for the selected LSP reduces costs; and

if the hybrid path route reduces costs:

activate a new IP link on each of the at least one lightpaths of the WDM topology, the new IP link being added to the IP links available for the routing of LSPs; and

reroute the selected LSP according to the hybrid path route.

18. (Original) The logic of Claim 17, further operable when executed to decommission an idle IP link after rerouting the selected LSP.

19. (Cancelled)

20. (Original) The logic of Claim 17, wherein logic operable when executed to determine whether performance of the hybrid path route for the selected LSP reduces costs comprises logic operable when executed to account for a cost associated with each IP link and each lightpath of the hybrid path route.

21. (Original) The logic of Claim 17, wherein logic operable when executed to activate a new IP link on each of the at least one lightpaths of the WDM topology comprises logic operable when executed to:

allocate an unused router port on each end of each of the at least one lightpaths; and
activate the allocated router ports with respective established lightpaths.

22. (Original) The logic of Claim 17, wherein each of the plurality of nodes of the IP network comprises an IP router.

23. (Original) The logic of Claim 17, wherein each of the lightpaths of the WDM topology couples optical crossconnects of the WDM topology.

24. (Canceled)

25. (Currently Amended) A system for managing network traffic, comprising:
means for provisioning an internet protocol (IP) network for communicating traffic,
the IP network operated by an IP service provider and comprising a plurality of nodes
coupled by IP links activated in an IP layer and available for the routing of label switched
paths (LSPs);

means for provisioning an internet protocol (IP) network for communicating traffic,
the IP network comprising a plurality of nodes coupled by IP links;

means for monitoring the IP network for a congestion event;

means for, upon detecting a congestion event, selecting a label-switched-path (LSP)
LSP of the IP network for reroute;

means for receiving a transformed topology constructed by an optical transport
service provider of a wavelength division multiplex (WDM) topology, the transformed
topology comprising a subset of lightpaths of the WDM topology that are available for, but
not currently activated in, the IP layer;

means for computing, based on the transformed topology, a hybrid path route for the
selected LSP between a first node and a second node of the plurality of nodes, the hybrid path
route comprising at least one IP link already activated in the IP layer and at least one
lightpath of a wavelength division multiplex (WDM) topology the WDM topology coupled
to the IP network but not activated in the IP layer;

means for determining whether performance of the hybrid path route for the selected
LSP reduces costs; and

if the hybrid path route reduces costs:

means for activating a new IP link on each of the at least one lightpaths of the
WDM topology, the new IP link being added to the IP links available for the routing of LSPs;
and

means for rerouting the selected LSP according to the hybrid path route.

26. (Original) The system of Claim 25, further comprising means for
decommissioning an idle IP link after rerouting the selected LSP.

27. (Cancelled)

28. (Original) The system of Claim 25, wherein means for determining whether performance of the hybrid path route for the selected LSP reduces costs comprises means for accounting for a cost associated with each IP link and each lightpath of the hybrid path route.

29. (Original) The system of Claim 25, wherein means for activating a new IP link on each of the at least one lightpaths of the WDM topology comprises:

means for allocating an unused router port on each end of each of the at least one lightpaths; and

means for activating the allocated router ports with respective established lightpaths.

30. (Original) The system of Claim 25, wherein each of the plurality of nodes of the IP network comprises an IP router.

31. (Original) The method of Claim 25, wherein each of the lightpaths of the WDM topology couples optical crossconnects of the WDM topology.

32. (Canceled)

33. (Currently Amended) A method for managing network traffic, comprising:

- provisioning an internet protocol (IP) network for communicating traffic, the IP network operated by an IP service provider and comprising a plurality of nodes coupled by IP links activated in an IP layer and available for the routing of label switched paths (LSPs), each of the plurality of nodes comprising an IP router;
- monitoring the IP network for a congestion event;
- upon detecting a congestion event, selecting a ~~label-switched-path (LSP)~~ LSP of the IP network for reroute;
- receiving a transformed topology constructed by an optical transport service provider of a wavelength division multiplex (WDM) Topology, the transformed topology comprising a subset of available lightpaths of the WDM topology, each lightpath of the WDM topology coupling optical crossconnects of the WDM topology but not currently activated in the IP layer;
- computing, based on the transformed topology, a hybrid path route for the selected LSP between a first node and a second node of the plurality of nodes, the hybrid path route comprising at least one IP link already activated in the IP layer and at least one lightpath of the WDM topology coupled to the IP network but not activated in the IP layer;
- determining whether performance of the hybrid path route for the selected LSP reduces costs;
- if the hybrid path route reduces costs:
 - activating a new IP link on each of the at least one lightpaths of the WDM topology, the new IP link being added to the IP links available for the routing of LSPs; and
 - rerouting the selected LSP according to the hybrid path route; and
 - decommissioning an idle IP link after rerouting the selected LSP.

34. (Cancelled)

35. (Previously presented) The method of Claim 1, wherein computing a hybrid path route comprises computing a hybrid path route comprising at least one non-lightpath link and at least one lightpath of a WDM topology coupled to the IP network.

36. (New) The method of Claim 1, wherein the transformed topology shields at least one detail of the actual WDM topology.

37. (New) The method of Claim 1, wherein the cost is a monetary cost.

38. (New) The method of Claim 1:

further comprising:

computing an alternate path route for the selected LSP between the first node and the second node, the alternate path comprising IP links already activated in the IP layer and not comprising any lightpaths of the WDM topology coupled to the IP network but not activated in the IP layer; and

determining whether the performance of the alternate path for the selected LSP reduces costs,

wherein the hybrid path route for the selected LSP is computed upon determining that the performance of the alternate path route for the selected LSP does not reduce costs.